

What is claimed is

1. A photocatalytically active coating of a substrate composed of at least two layers produced by solution chemistry and with at least one first underlayer applied to the substrate and composed of an inorganic polymer and at least one second overlayer composed of  $\text{TiO}_2$  particles, **characterized in that** the underlayer comprises less than 0.5% by weight of  $\text{TiO}_2$  particles, is pore-free, and comprises at least 5% by weight of  $\text{ZrO}_2$ .
2. The photocatalytically active coating as claimed in claim 1, **characterized in that** the inorganic polymer is composed of one or more metal oxides covalently bonded to one another from the group of  $\text{SiO}_2$ ,  $\text{ZrO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Nb}_2\text{O}_3$ ,  $\text{Ta}_2\text{O}_3$ ,  $\text{CaO}$ .
3. The photocatalytically active coating as claimed in claim 1 or 2, **characterized in that** the underlayer is composed of at least two layers applied in succession of identical or different constitution.
4. The photocatalytically active coating as claimed in any of claims 1 to 3, **characterized in that** the substrate used comprises one or more polymers selected from the group of PVC, PP, PE, PMMA, PS, PC, polyesters, epoxy materials, polyurethanes, polyisocyanates, SBR, ABS, ASA, NBR, or copolymers composed of acrylonitrile, styrene, butadiene, methacrylate, or isoprene, in each case in the form of homo- or copolymer, in the form of coextrudate, or in the form of polymer blend.
5. A process for production of photocatalytically active coatings on a substrate, characterized by the following steps of the process:
  - a. coating of a substrate with an inorganic polymer by

solution chemistry via application of a suspension of the inorganic polymer or its chemical precursors in an organic suspension medium,

5 b. complete or partial removal of the organic suspension medium, to give an underlayer.

c. application of a dispersion composed of  $\text{TiO}_2$  particles in an organic dispersion medium to the underlayer.

10 d. complete or partial removal of the organic dispersion medium to give an overlayer.

e. heat-treatment of the under- and overlayer at from 20 to 120°C for from 10 to 300 sec,

15 with the proviso that the underlayer comprises less than 0.5% by weight of  $\text{TiO}_2$  particles, is pore-free, and comprises at least 5% by weight of  $\text{ZrO}_2$ .

6. The process as claimed in claim 5, **characterized in that** the suspension used in step a) of the process comprises one or more metal oxides from the group of  
20  $\text{SiO}_2$ ,  $\text{ZrO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Nb}_2\text{O}_3$ ,  $\text{Ta}_2\text{O}_3$ ,  $\text{CaO}$ , and/or the corresponding alkoxides, chlorides, nitrates, hydroxides, formates, or acetates, in each case individually or in the form of a mixture.

25 7. The process as claimed in claim 5 or 6, **characterized in that** the organic suspension and dispersion medium comprises ethanol, propanol, isopropanol, isobutanol, n-butanol, glycol, ethylene glycol, propylene glycol, butylene glycol, water,  
30 formic acid, and/or acetic acid, alone or in the form of a mixture.

8. The process as claimed in any of claims 6 to 8, **characterized in that** steps a) and b) of the process  
35 are carried out at least twice in succession.

9. The process as claimed in any of claims 6 to 8, **characterized in that** steps c) and d) of the process

are carried out at least twice in succession.

10. A window profile, a door profile, a roller-shutter  
segment, a window sill, an architectural panel, a door  
5 leaf, a gutter, a downpipe, or a plastics or aluminum  
shell for the covering of window or door frames, with a  
coating as claimed in any of claims 1 to 4.